Calculus 1
First

43+6
60

54
60

Palestine Technical University
Mathematics Department.
~~Linear Algebra I (Math 127)~~.
Dr. Khalida Nazzal
First Exam

90
100

Nov, 4, 2009

RTN 11:00 - 11:50

معن سلام فقدان
Student name بالعربيه:
Student # [redacted]

I :(36 points) Choose the correct answer.

1. The solution of the inequality $\left|\frac{2}{x}-4\right|<1$ is

a) $(\frac{2}{5},\frac{2}{3})$ b) $(\frac{3}{2},\frac{7}{2})$
c) $\infty-(\frac{2}{5},\frac{2}{3})$ d) $\infty-(\frac{3}{2},\frac{7}{2})$.

$\frac{2}{5}<x<\frac{2}{3}$

$-1<\frac{2}{x}-4<1$
$+4 \quad +4 \quad +4$
$3<\frac{2}{x}<5$
$\frac{1}{3}>\frac{x}{2}>\frac{1}{5}$

$\frac{2}{3}>x>\frac{2}{5}$

2. If $\lim_{x\to 0^+}(4g(x))^{\frac{1}{3}}=2$, then $\lim_{x\to 0^+}g(x)=$

a) 8 b) 4
c) 2 d)-2.

$\sqrt[3]{4x}=2$
$4x=8 \quad x=\frac{8}{4}=2$

3. $\lim_{x\to\infty}\frac{\cos x-1}{x}=$

a) ∞.
b) 1
c)D.N.E.
d) 0.

$\lim_{x\to\infty}\frac{\cos x-1}{x}\left(\frac{\cos x+1}{\cos x+1}\right)=\frac{\cos^2 x-1}{x(\cos x+1)}=\frac{-\sin^2 x}{x(\cos x+1)}$
$\sin^2 x+\cos^2 x=1$
$\frac{\infty}{\infty}$
$=\lim_{x\to\infty}\frac{-\sin x}{x}\cdot\frac{\sin x}{\cos x+1}=1.0=0$

4. Let $f(x)=\frac{1}{x-1}$, and $g(x)=\sqrt{x}+1$, then the domain of the function $(fog)(x)$ is

a) $[0,\infty)$.
b) $(0,1)\cup(1,\infty)$
c) $(0,\infty)$.
d) $(-\infty,0)\cup(0,\infty)$.

$\frac{1}{x-1}\Rightarrow x-1=0/x=1 \quad x\geq 1$
$f(g(x))=\frac{1}{(\sqrt{x}+1)-1}=\frac{1}{\sqrt{x}+1-1}=\frac{1}{\sqrt{x}} \quad y\neq 0$

5. The vertex of the parabola $-2x^2+4x+1$ is

a) (0, 1).
b) (3, -5).
c) (2, 1).
d) (1, 3).

$\frac{-b}{2a}=\frac{-4}{2(-2)}=\frac{-4}{-4}=1$

$f(1)=-2(1)^2+4(1)+1$
$=-2+4+1$
$=2+1=3$

30
4
14
48

تم الرفع بواسطة م. معن أبو عيسى

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6. The function $f(x) = x^3 - 2x + 2$ has

a) a zero between -2 and 0.

b) a zero between 2 and 3.

b) no roots.

d) no y intercepts.

$(-2)^3 - 2(-2) + 2$

$-8 + 4 + 2$

-2

2

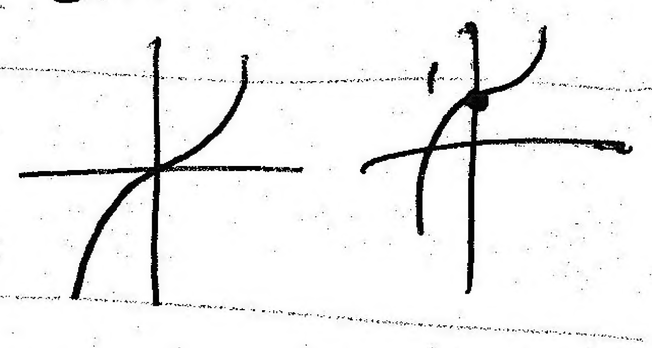
$[-2, 0]$ have zero between $[-2, 0]$

7. If f is odd and $\lim_{x \to 0^-} f(x) = 1$, then $\lim_{x \to 0^+} f(x) =$

a) 1. b) -1.

c) 0. d) else.

$f(-x) = -f(x)$



8. The graph of the equation $x^2 + y^2 - 4x - 6y - 3 = 0$ is

a) a circle centered at (2, 3) and radius 4.

b) a circle centered at (-2, 3) and radius 3.

c) a circle centered at (-2, 3) and radius 4.

d) an ellipse centered at (2, 3).

e) an ellipse centered at (-2, 3).

$(x^2 - 4x + 4) + (y^2 - 6y + 9) = 4 + 9 + 3$

$(x - 2)^2 + (y - 3)^2 = 16$

(2, 3) radius 4

9. Let $f(x) = \begin{cases} \sqrt{-x} & -4 \le x \le 0 \\ \sqrt{x} & 0 < x < 4 \end{cases}$. Then, the range of f is

a) [–4,4]

b) [–2,2)

c) [0,2)

d) [0,2].

0 / 2

$[0, 2)$

10. At $x = 3$, the function $f(x) = \dfrac{x^2 - 9}{x - 3}$ has

a) infinite discontinuity.

b) a removable discontinuity.

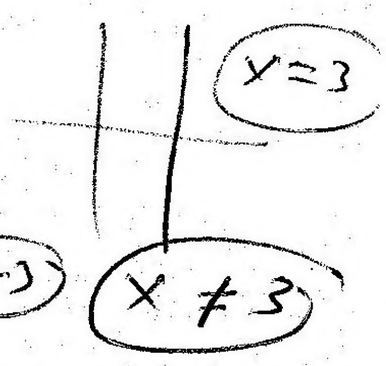
c) a jump discontinuity.

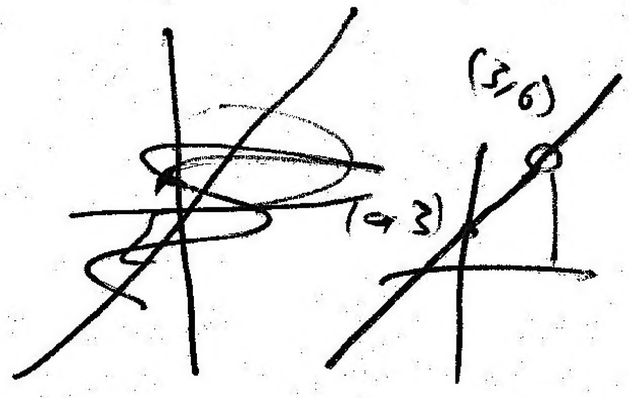
d) a horizontal asymptote.

$\dfrac{(x - 3)(x + 3)}{x - 3}$ $(x + 3)$

$x \neq 3$

$f(3) = 3 + 3 = 6$





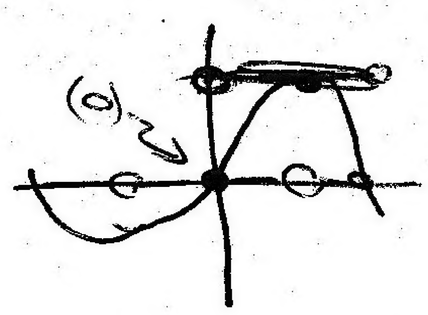
11. $\lim_{x \to 0^+} \sin\lfloor x \rfloor =$

a) 0

b) 1

c) -1

d) DNE.



12. The equation of the line that passes through (1, -1) and normal to the line $y = 3x + 9$ is

a) $y = x + 2$.

b) $y = -x - 4$.

c) $3y + x + 2 = 0$.

d) $y = 4 - x$.

$y = 3x + 9$

$m_1 = 3$

$m_1 m_2 = -1$

$3 m_2 = -1 \Rightarrow m_2 = \dfrac{-1}{3}$

$y - y_0 = m(x - x_0)$

$y - -1 = \dfrac{-1}{3}(x - 1)$

$y + 1 = \dfrac{-1}{3}x + \dfrac{1}{3} \Rightarrow y = \dfrac{-1}{3}x - \dfrac{2}{3}$

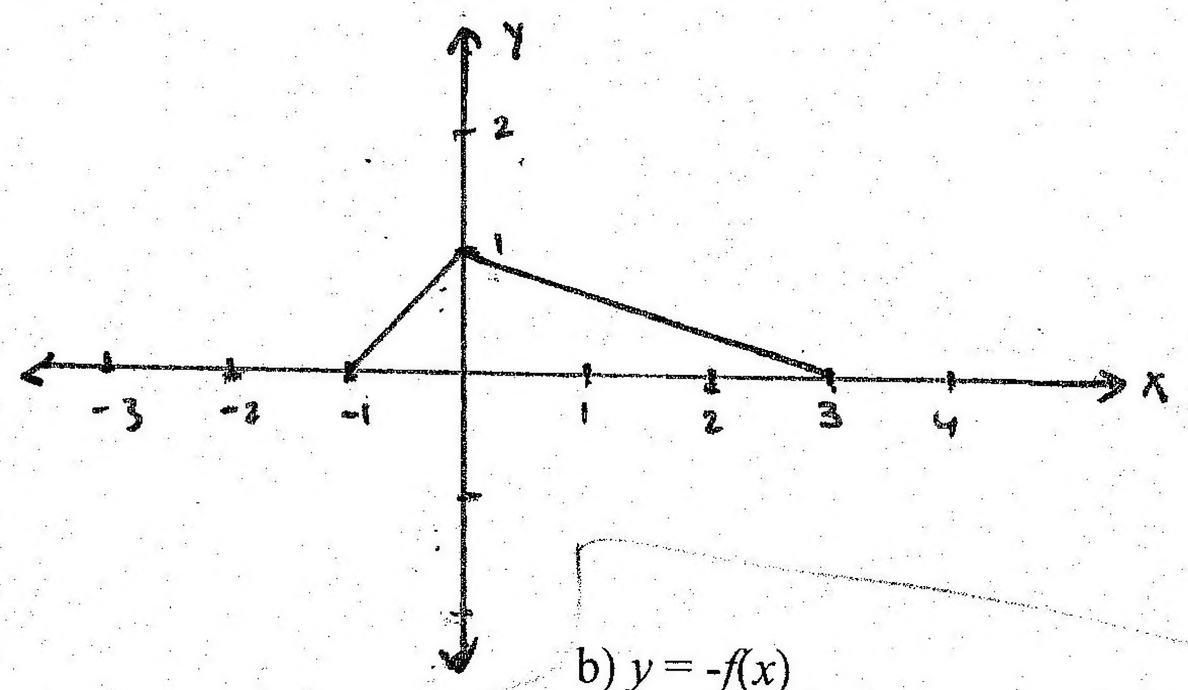
2 $3y + x + 2 = 0$

$3y = -x - 2$

$\times 3$

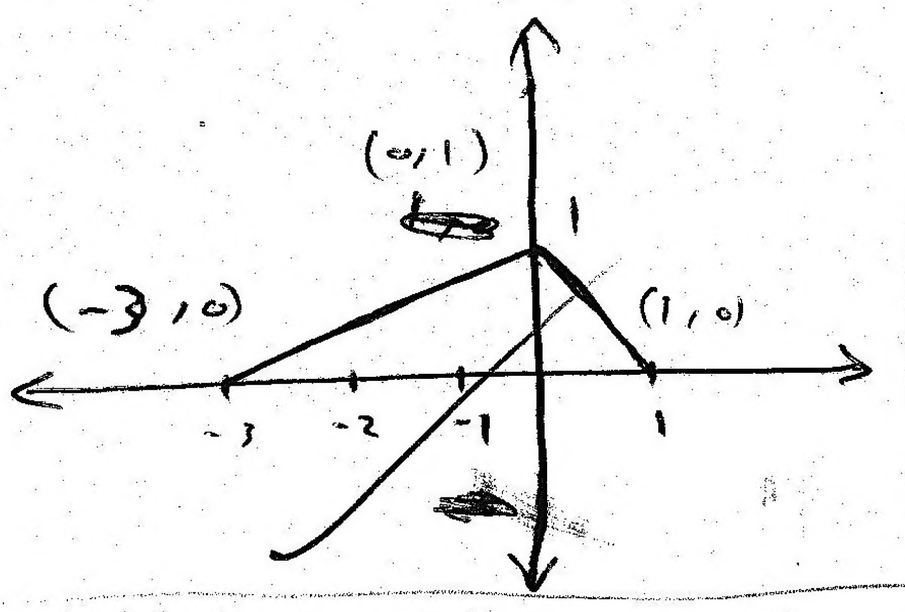
II

1. The graph of f is shown. Draw the graph of each function (10 points)



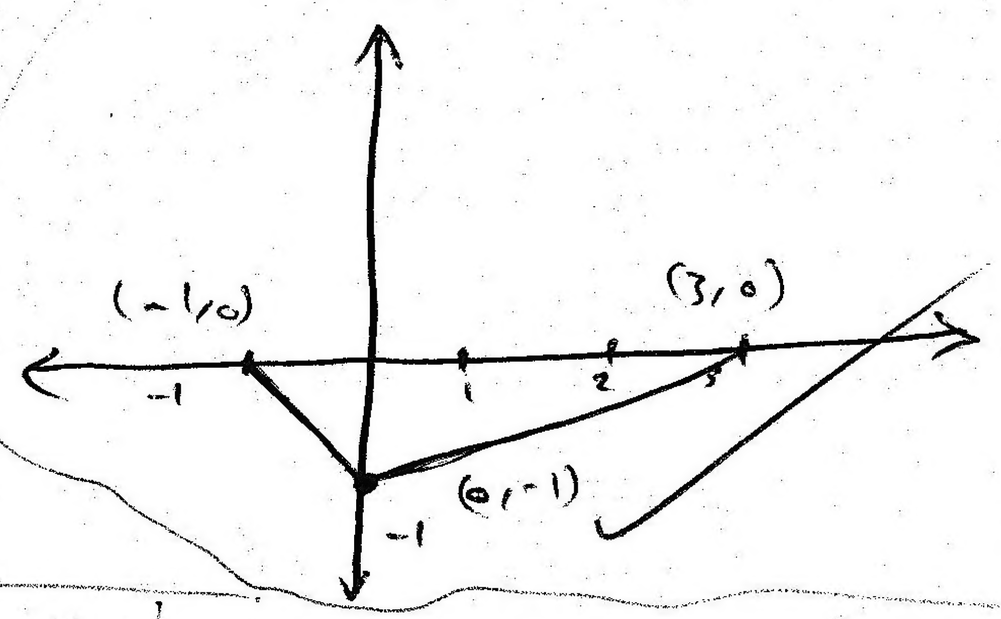
a) $y = f(-x)$.

reflection about y-axis



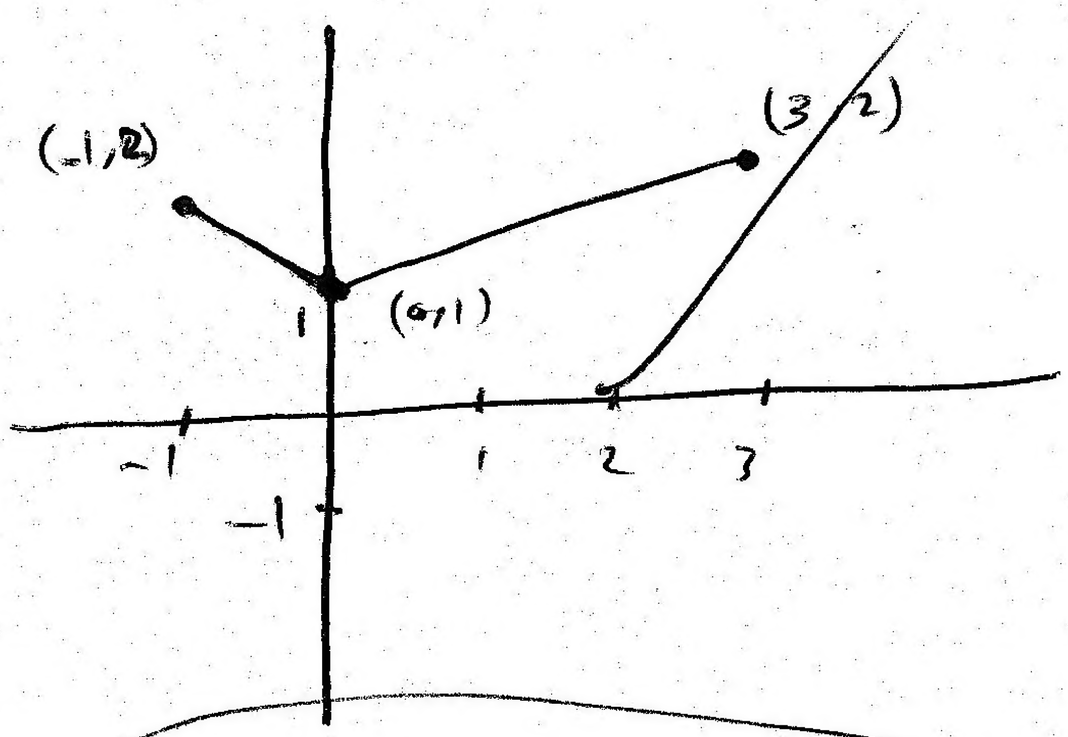
b) $y = -f(x)$

reflection about x-axis



c) $y = 2 - f(x)$

$y = -f(x) + 2$



reflection about x-axis

and shifts 2 units above

d) $y = f(x-2)+1$

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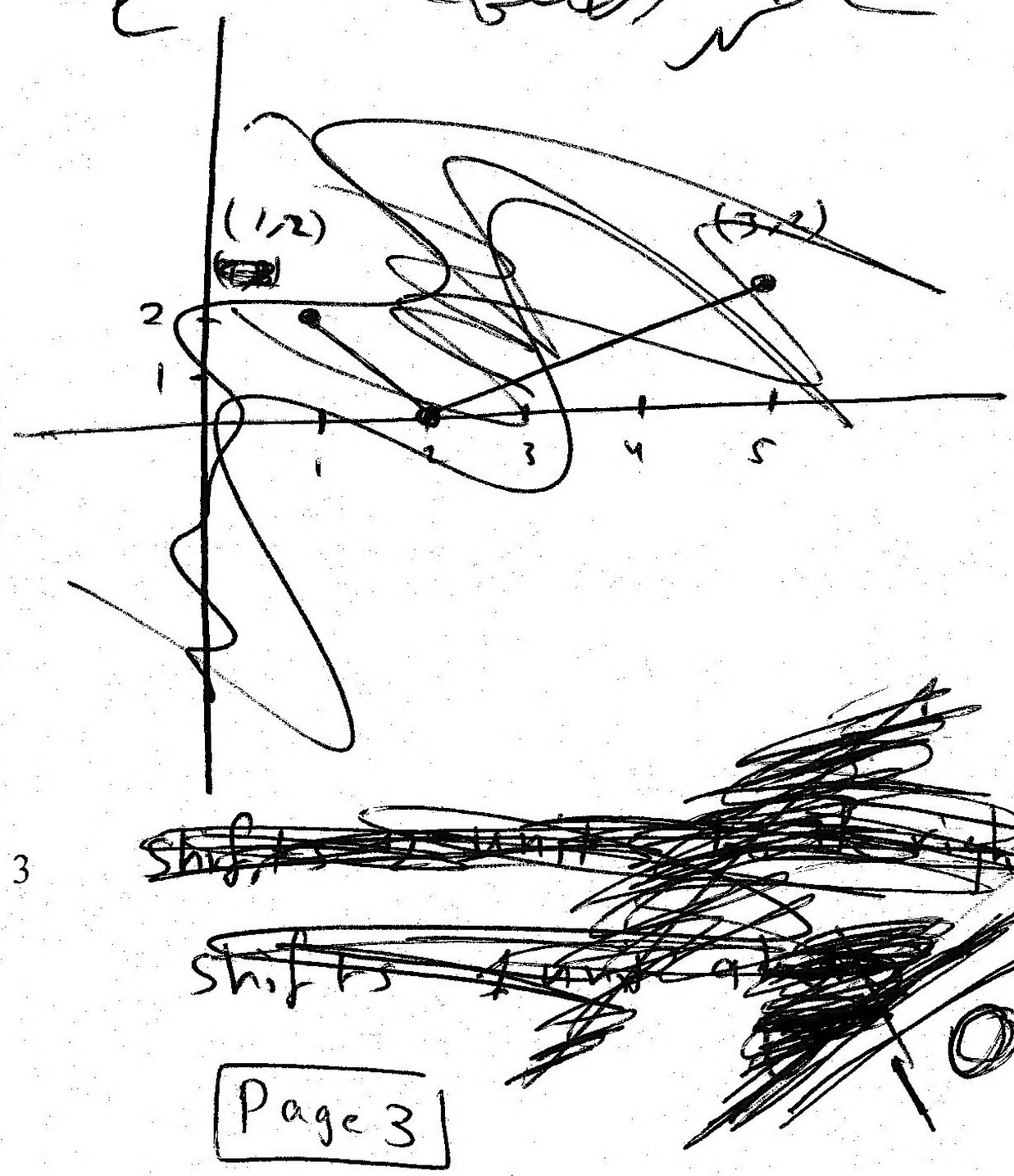
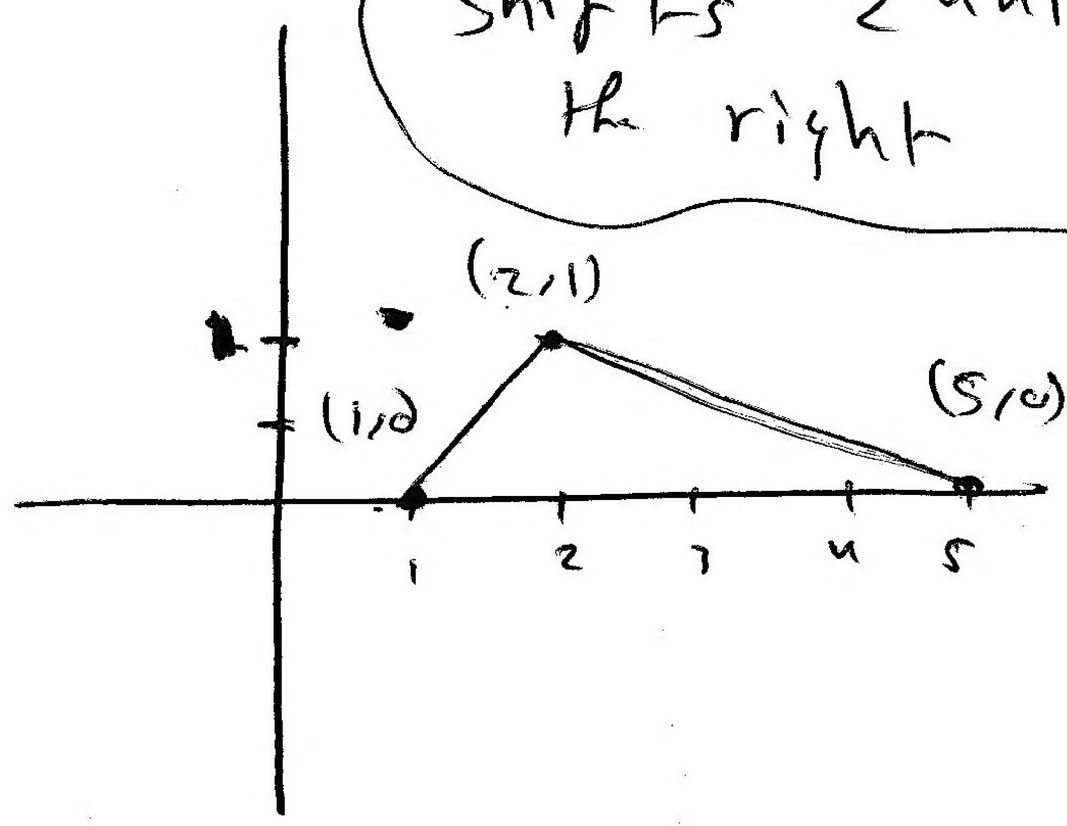
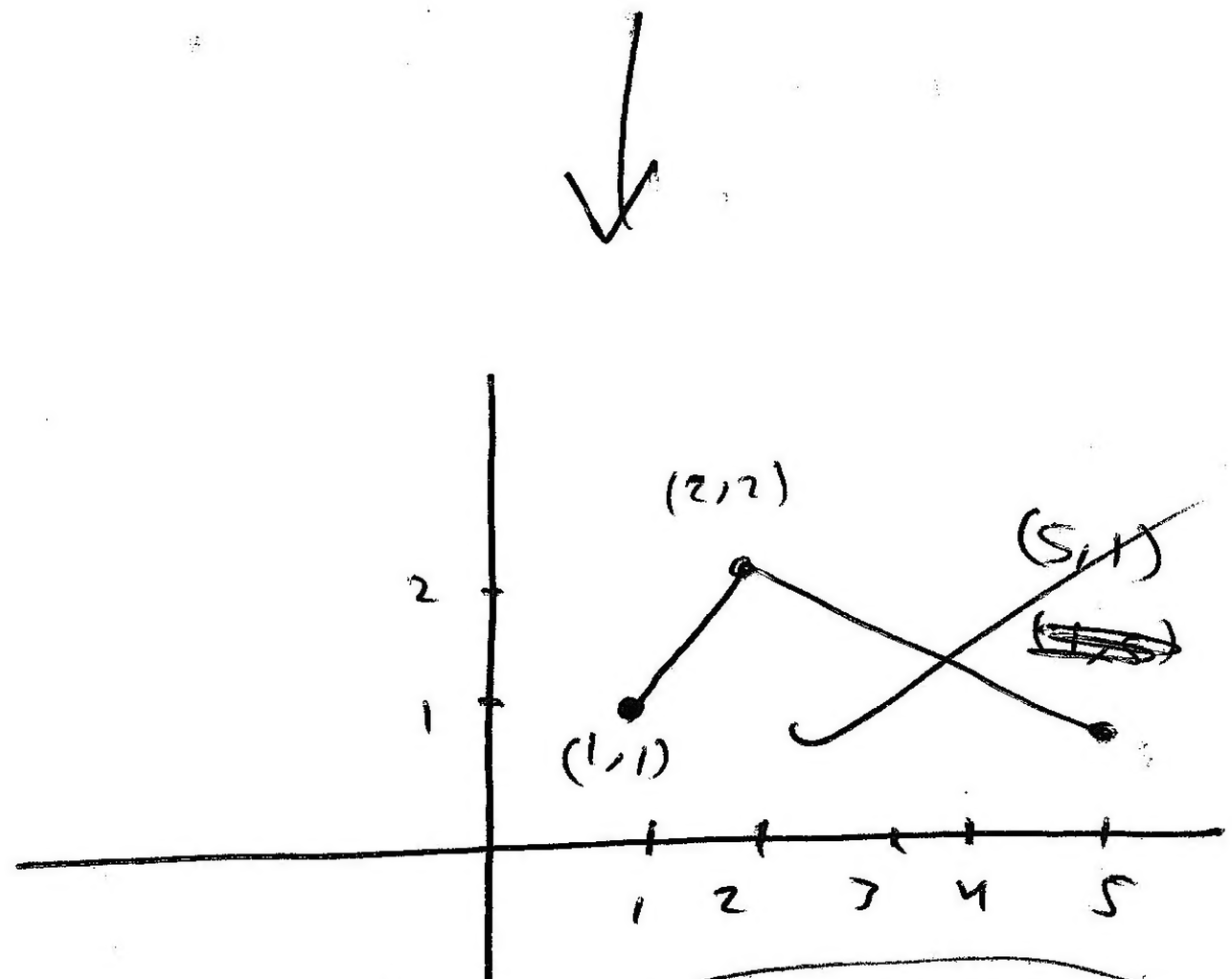


shifts 2 units to the right and 1 unit up

(d)

shifts 2 units to the right





then: shifts 1 unit ~~down~~ above

2. Consider the function $f(x)=\dfrac{2x+3}{x+1}$. (14 points)

a) Find the functions' x and y intercepts.

x-intercept $\Rightarrow$ $y=0$ $\Rightarrow$ $2x+3=0$ $\Rightarrow$ $x=\frac{-3}{2}$ $\left(\frac{-3}{2},0\right)$

$\frac{2x+3}{x+1}=0$

y-intercept $\Rightarrow$ $x=0$ $\Rightarrow$ $y=\frac{2(0)+3}{0+1}=\frac{3}{1}=3$ $(0,3)$

b) $\lim_{x\to\infty} f(x) = \dfrac{\frac{2x}{x}+\frac{3}{x}}{\frac{x}{x}+\frac{1}{x}} = \dfrac{2+0}{1+0} = 2$

c) $\lim_{x\to-\infty} f(x) = \dfrac{\frac{2x}{x}+\frac{3}{x}}{\frac{x}{x}+\frac{1}{x}} = \dfrac{2+0}{1+0} = 2$

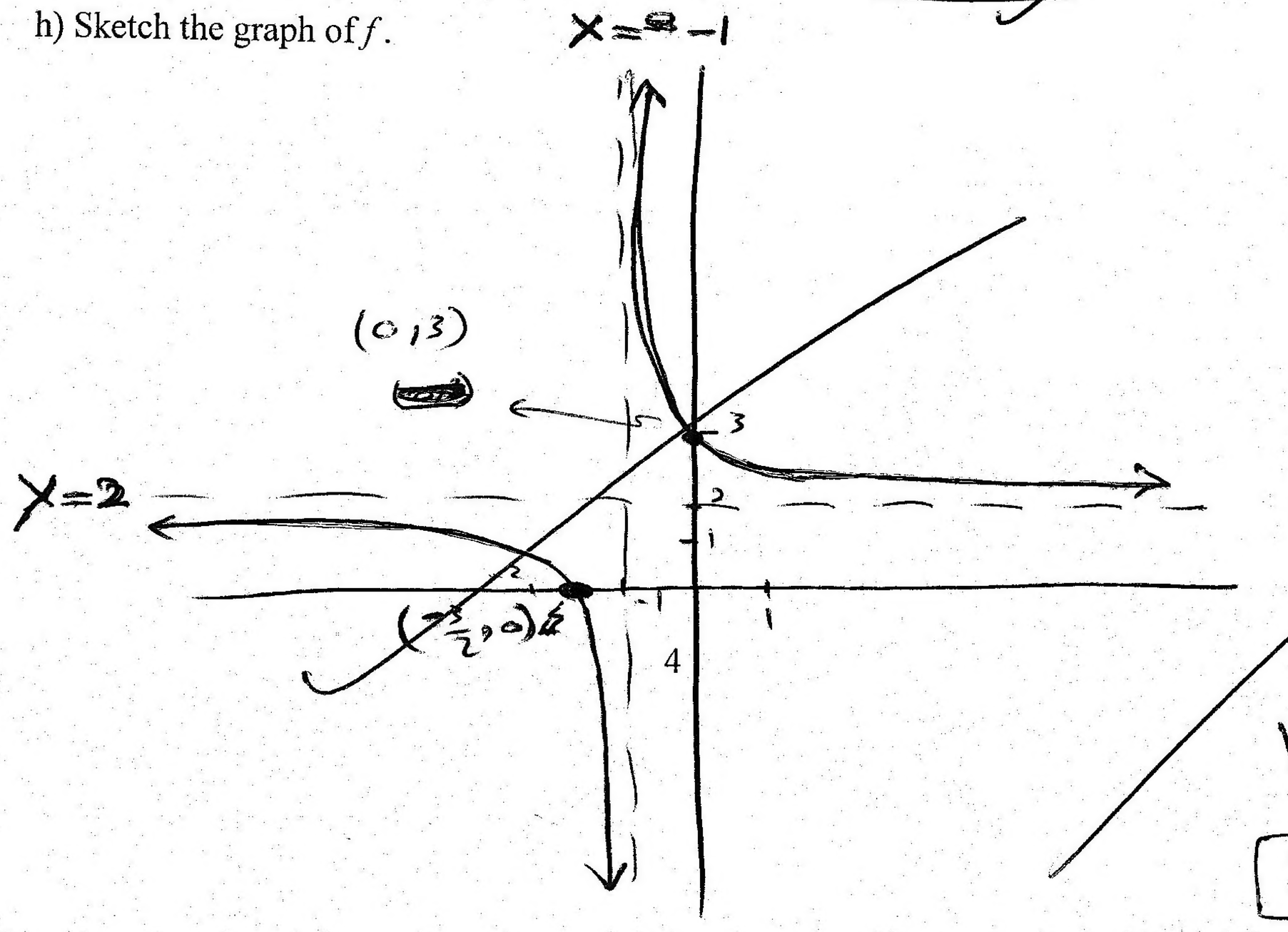
d) $\lim_{x\to-1^+} f(x) = \dfrac{2x+3}{x+1} = +\infty$

e) $\lim_{x\to-1^-} f(x) = \dfrac{2x+3}{x+1} = -\infty$

f) The equation of the horizontal asymptote (if exists) is $y=2$

g) The equation of the vertical asymptote (if exists) is $x=-1$

h) Sketch the graph of f.



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